

Please rewrite claims 7, 52, 53, and 85 as follows:

7. (Twice Amended) A [left] ventricular or biventricular cardiac output restoration system for the treatment of heart failure that incorporates blood-pumping elements of sufficiently-compact size configured to reside wholly within the natural heart [, such that said pumping elements function independently or in conjunction with natural (or prosthetic heart valves) to provide [the entire cardiac output] all or part of the cardiac output required for the systemic, [(left) circulation and to provide all, none or part of the cardiac output required for] the pulmonic, or the systemic and the pulmonic [(right)] circulation, said blood-pumping elements comprising:

(a) means to receive energy from a source external to the heart and to apply said energy to actuate pumping means, and

(b) non-thrombogenic pumping means to impart mechanical energy to the bloodstream and thereby effectively restore function of the heart.

52. (Twice Amended) An artificial heart, heart assist, or blood pumping device adapted to propel blood therethrough by means of rotary hydrodynamic fluid pumping elements, comprising:

(a) inflow and outflow means by which to connect said device to the vascular system,

(b) blood containing housing means within which ^athe pumping mechanism is contained,

1 (c) minimally-hemolytic axial flow, mixed flow, or centrifugal flow rotary pump impeller means, mechanically supported and rotated by a magnetically actuated rotor [means],

2 (d) minimally-hemolytic wear-resistant [blood-emersed]blood-immersed mechanical journal bearing means supporting said rotor for rotation [configured] in a configuration such that [the exposed junction] all of the exposed junctions of the rotating and stationary components [of the bearings is] of the ^{pumping elements} pump and bearings are washed by high enough blood flow to prevent thrombus accumulation severe enough to cause failure of the pump, and,

3 (e) power means and magnetic actuator means to provide force to rotate said rotor and impeller means thereby pumping the blood.

4 // 53. (Twice Amended) An artificial heart, heart assist, or blood pumping device adapted to propel blood therethrough without excessive blood damage or thrombosis by means of rotary hydrodynamic fluid pumping elements, comprising:

5 (a) inflow and outflow means by which to connect said device to the vascular system,

6 (b) blood containing housing means including a generally cylindrical tubular segment,

7 (c) axial flow or mixed flow rotary pump impeller means adapted to pump blood with minimal hemolysis,

mechanically supported and rotated by magnetically actuated rotor means,

(d) said magnetically actuated rotor means, ^{structured to be} immersed in blood within said generally cylindrical housing segment, and [rotatably] mechanically supported by [mechanical] radial bearing means [configured] in a configuration such that [the exposed junction] all of the exposed junctions of the rotating and stationary components [thereof is] ^{pumping elements} of the pump and ~~bearings~~ are washed by high enough blood flow to prevent thrombus accumulation severe enough to cause failure of the pump,

(e) said rotor means and said generally cylindrical segment of said housing means having therebetween an annular generally cylindrical blood channel through which flows all or part of the blood pumped by the device and across which forces to rotate the [impeller] rotor are exerted magnetically, and,

(f) power means and magnetic actuator means to provide force to rotate said rotor and impeller means thereby pumping the blood.

21 ~~25~~. (Twice Amended) A rotary hydrodynamic blood pump comprising:

a blood-pumping rotor including an impeller;

means to suspend the rotor for rotational motion within the bloodstream on a wire in tension that passes through a cylindrical hole in the rotor;

means to magnetically rotate the rotor within the
bloodstream;

83 conclude
magnetic, mechanical or magnetic and mechanical
thrust-bearing means to maintain the rotor in proper axial
position on the wire,

configured such that [the exposed junction] all
exposed junctions of the rotating and stationary components
thereof [is] are washed by high enough blood flow to prevent
thrombus accumulation severe enough to cause failure of the
pump.

Please amend claims 55, 56, 64 and 67 as follows:

Claim 55, lines 6-7, delete "such as pyrolytic carbon,
ceramic, or sapphire,";

Claim 56, lines 6-7, delete "such as pyrolytic carbon,
ceramic, or sapphire,";

Claim 64, line 4, change "said" to -- an --; and

Claim 67, line 3, change "said" to -- an --.

DNW
11-6-90